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Minute variations may occur in other parts of this spiral but it is doubtful if it will be possible to establish from the present material whether or not the suspected changes are real. The observations are difficult as the photographs must be accurately matched both as to intensity and definition. For a given region exposures should be of the proper length to show the detail to the best advantage. In photographs of M 99 too long an exposure would make it very difficult or impossible to detect small changes in the nucleus. Short exposures showing but little more than the nucleus and brighter condensations are valuable.

Observations of many other nebulae in addition to M1 and M 99 (including a number of spirals), in an effort to detect possible changes, have so far been fruitless but the observing program followed in the past will be continued.

Lowell Observatory, C. O. LAMPLAND.
Flagstaff, Arizona, May 18, 1921.

NOTE ON COMET *b* 1921 (PONS-WINNECKE)

This periodic comet was picked up on its present return by Barnard at the Yerkes Observatory the evening of April 10th. It moves about the Sun with a period of approximately six years. At present (May 4th) it is in the constellation *Hercules* and will be in a favorable position for observation for two or three months.

By estimating the amount of perturbations for the orbit of this comet during its last tour in the neighborhood of *Jupiter*, Crommelin gave an approximate set of elements of the present orbit. According to this estimate the comet would come to perihelion near June 15th this year. The time interval between this date and the last perihelion passage is very closely 5.8 years. Assuming this period of 5.8 years we passed an orbit thru the first three observations available, viz.: April 12th, 17th and 19th. The orbit with a brief ephemeris extending to May 5th was telegraphed to Harvard College Observatory for distribution. This orbit, however, is somewhat in error due to the fact that the right ascension of the middle date (April 17th) was in error by about 22″.

We have just completed a second orbit based on observations of April 12th, 19th and 29th. This orbit also has the assumed period of 5.8 years. The elements together with an ephemeris extending to May 19th have been telegraphed to Harvard College Observatory for distribution.

According to this second orbit the comet will come to perihelion June 12.95 Gr.M.T., at which time it will be 1.04 astronomical units (97 million miles) from the Sun. It will also then be near the ecliptic. Its orbit plane is inclined 18°50′ to the ecliptic, but the comet crosses the ecliptic, going from the northern side to the southern, June 20.8 Gr.M.T., about eight days after its closest approach to the Sun.

An interesting thing about the comet at this time is its position with respect to the Earth. On May 7th it is 0.31 of an astronomical unit distant from the Earth and 0.23 distant on May 19th. Its closest approach to the Earth will be about half a day before its perihelion passage, that is about June 12.5 Gr.M.T. At this time the distance from the Earth will be 0.14 of an astronomical unit (about thirteen million miles). After this date the comet will recede from both the Earth and the Sun. The comet will attain its maximum brilliancy at this time (June 12.5 Gr.M.T.) when it will be thirteen times brighter than on April 19th. It will then be only three magnitudes brighter, so if it was between the tenth and the eleventh magnitudes on April 19th, it will be between the seventh and eighth magnitudes at maximum brilliancy. Consequently it will not become visible without telescopic aid.

From the middle of May until the middle of June there is not much variation in the distance of the comet from the Earth. They will seemingly keep pace with each other, the Earth being from twenty (middle of May) to thirteen (middle of June) million miles behind the comet.

On June 28.9 Gr.M.T. the Earth will be near the place where the comet will have crossed the ecliptic eight days before so that if there is meteoric material in the wake of the comet we may expect to encounter it and witness a meteor-shower about that date.

We are at present deducing the perturbations in the motion of the comet produced by the near approach to the Earth. When completed these will probably modify slightly some of the data given above.

The elements deduced from observations of April 12th, 19th and 29th with assumed period are:

T = 1921 June 12.9526 Gr.M.T.
ω = 170°34′
Ω = 97 51
i = 18 50
q = 1.0399

e = 0.6779
log a = 0.50895
μ = 611″.757
P = 5.80 years (assumed)

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